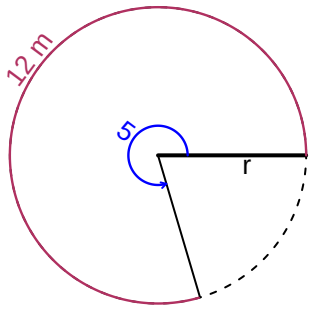
Name: Date:

Trig Final (SLTN v658)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 12 meters. The angle measure is 5 radians. How long is the radius in meters?

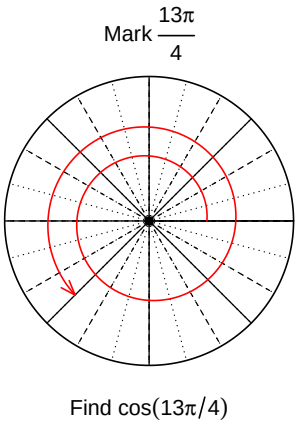


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

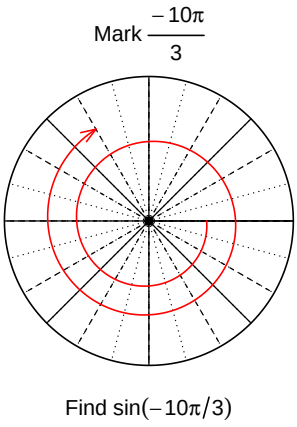
$r = 2.4$ meters.

Question 2

Consider angles $\frac{13\pi}{4}$ and $\frac{-10\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{13\pi}{4}\right)$ and $\sin\left(\frac{-10\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\cos(13\pi/4)$



Find $\sin(-10\pi/3)$

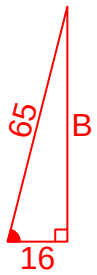
$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$

$\sin(-10\pi/3) = \frac{\sqrt{3}}{2}$

Question 3

If $\cos(\theta) = \frac{-16}{65}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

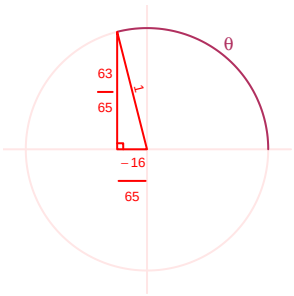
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$16^2 + B^2 = 65^2$$
$$B = \sqrt{65^2 - 16^2}$$
$$B = 63$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{63}{65}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 7.64 meters, a frequency of 8.65 Hz, and a midline at $y = 3.74$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.64\sin(2\pi 8.65t) + 3.74$$

or

$$y = 7.64\sin(17.3\pi t) + 3.74$$

or

$$y = 7.64\sin(54.35t) + 3.74$$